

# Fundamental Mechanics: Quiz 4

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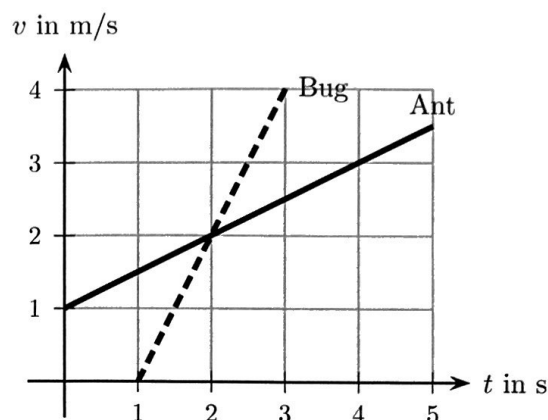
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Formulae:  $\vec{v}_{\text{avg}} = \frac{\Delta \vec{r}}{\Delta t}$   $\vec{a}_{\text{avg}} = \frac{\Delta \vec{v}}{\Delta t}$

$a = \text{slope of } v \text{ vs. } t$   $\vec{F}_{\text{net}} = \sum \vec{F}_i = m\vec{a}$

An ant and a bug walk along straight wires. The graph illustrates their velocities vs. time. They have the same mass. Which of the following (choose one) is true at 2.0s?

- i) The net force on the ant is the same as on the bug.
- ii) The net force on the ant is larger than the net force on the bug.
- iii) The net force on the ant is smaller than the net force on the bug.



Briefly explain your answer.

$F = ma$   
Slope of  $v$  vs  $t$  gives  $a$   
Bug slope at  $t=2$  is 2  
 $2 = 2 \text{ m/s}^2$   
Ant slope at  $t=2$  is  $1/2$   
or  $0.5 \text{ m/s}^2$

Bug accel  $>$  Ant accel  
 $F = ma$

$\therefore$  net force on Bug  $>$  net force on ant

$$\text{Bug} = \vec{a}_{\text{avg}} = \frac{\Delta v}{\Delta t} = \frac{2-0}{2-1} = 2$$

$$\text{Ant} = \vec{a}_{\text{avg}} = \frac{3-1}{4-0} = \frac{2}{4} = \frac{1}{2}$$

$$\vec{v}_{\text{avg Bug}} = \vec{v}_{\text{avg Ant}}$$

Bug accel  $>$  larger than ant

$$F = ma \checkmark$$